

Perioperative Implications of Coronary–Camerel Fistula

Abstract

Coronary–cameral fistulas (CCFs) are mostly congenital in origin and rarely acquired. Clinical symptoms are decided by the hemodynamic significance of the coronary fistula. Even in asymptomatic patients, it is essential to know about coronary CCF particularly if the patient is to undergo cardiac surgery with cardioplegic cardiac arrest. Incidental finding of coronary CCF should never be ignored. Intraoperative myocardial protection and methods used are significantly influenced by such fistula.

Keywords: Coronary fistula, coronary steal phenomenon, myocardial protection

Introduction

Coronary–cameral fistula (CCF) is an anomalous connection between cardiac chamber and coronary artery. Apart from the cardiac chamber, coronary artery fistula can also communicate with a major vessel (venae cavae, pulmonary artery, veins, or coronary sinus). CCFs are discovered incidentally in 0.1% of patients undergoing coronary angiograms.^[1]

Case Report

A 62-year-old male presented with shortness of breath on mild exertion. Transthoracic echocardiography examination revealed severe mitral stenosis. The patient was scheduled for mitral valve replacement surgery. Preoperatively, the patient underwent coronary angiography. No significant obstructive lesion was observed in coronary arteries. However, fistulous connection was noted from distal left anterior descending artery to left ventricle. Contrast was shunted to left ventricular (LV) chamber during angiography [Videos 1 and 2]. After smooth anesthesia induction, midline sternotomy was performed followed by aortic and bicaval cannulation after heparinization. Before antegrade cardioplegia, LV vent was inserted through pulmonary vein. During cardioplegia administration, LV was decompressed with the LV vent. Diastolic arrest was achieved

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and mitral valve replacement surgery was performed uneventfully. Patient could be weaned off cardiopulmonary bypass with minimal inotropic support. LV function was good echocardiographically.

Discussion

Coronary–cameral fistulas (CCFs) are mostly congenital in origin and rarely acquired.^[2] Congenital fistula can be an isolated finding or associated with other congenital heart abnormalities such as severe left or right outflow tract obstruction in aortic atresia with hypoplastic left heart syndrome or pulmonary atresia with intact interventricular septum, respectively. Acquired coronary artery fistulas are uncommon and are secondary to trauma or interventional procedures such as stab/gunshot wound, cardiac catheterization, angioplasty, endomyocardial biopsy, or pacemaker implantation.^[2]

Majority of such fistulas originate from right coronary artery (52%) followed by left anterior descending artery (30%) and left circumflex artery (18%).^[3] More than 90% of the fistulas terminate in the right side of the heart^[4] and rarely into left ventricle or pericardium. Hence, there can be left-to-right shunt or a left-sided volume overload if fistula drainage is in the right or left cardiac chamber, respectively. Reported incidence of coronary artery-LV fistula is merely 1.2% of all coronary artery fistulae.^[5]

Clinical symptoms are decided by the hemodynamic significance of the coronary fistula and which is dependent

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on its size, resistance of the recipient chamber, and myocardial ischemia.^[6] Although most fistulas are small and asymptomatic, untreated hemodynamically significant fistula can present clinically in 19% of patients with age <20 years and 63% of the patients with age >20 years. Coronary artery fistula can potentially cause myocardial ischemia by coronary artery steal phenomenon.^[7,8] Myocardial ischemia was demonstrated on treadmill test and Holter monitoring in patients with coronary artery fistula.^[9] Acute myocardial infarction due to coronary steal phenomenon by coronary artery fistula has also been reported.^[8] Moreover, fistula with hemodynamically significant left-to-right shunt may lead to congestive heart failure and pulmonary artery hypertension. Other reported complications are thrombosis and/or embolism, endocarditis, rupture, atrial fibrillation, premature atherosclerosis, and sudden cardiac death.^[10,11]

Although echocardiography can show large coronary artery fistula, coronary angiography not only diagnoses it but can also demonstrate the size, anatomy, number, origination, and termination site of the fistulas. Multidetector computed tomography and magnetic resonance imaging can also be useful to evaluate the anatomy, flow, and function of CCF.^[7] Symptomatic patients with large, hemodynamically significant fistulas warrant surgical or percutaneous catheter closure. Clinically, silent and hemodynamically insignificant fistula may not need corrective treatment. However, such patients need regular follow-up as smaller fistulas can get bigger with the age.^[2] Even in asymptomatic patients, it is essential to know about coronary CCF particularly if the patient is to undergo cardiac surgery with cardioplegic cardiac arrest. Coronary CCF can potentially affect myocardial protection intraoperatively. In patients with coronary-LV fistula, administration of antegrade cardioplegia will significantly shunt cardioplegic solution to LV cavity. Distended ventricular chamber would increase the wall stress which is not at all favorable for myocardial protection. Cardioplegic delivery to the myocardium may not be adequate and effective. Keeping the vent in the LV before antegrade cardioplegia can decompress the ventricle in such cases. However, retrograde cardioplegia through coronary sinus can alleviate these problems and simultaneously provide good myocardial protection. In the present case, CCF was not surgically addressed due to its small size, and it was not causing LV dilatation.

Incidental finding of coronary CCF should never be ignored. Intraoperative myocardial protection and methods used are significantly influenced by such fistula.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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